Proper Use and Deployment of Thermal Image Cameras

EXECUTIVE LEADERSHIP

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ABSTRACT

This research project identified information that would assist this author in the development of a Standard Operating Guideline for the use and deployment of Thermal Imaging Cameras.

The problem is that the City of Boca Raton Fire Rescue Services Department has not developed a Standard Operating Guideline for the use of this equipment.

The purpose of this applied research project was to develop a Standard Operating Guideline that would insure that the Thermal Imaging Camera equipment is used to its full potential for the benefit of the citizens of Boca Raton.

The research employed was evaluative research methodology to answer the following questions: 1) Under what conditions should firefighters use a Thermal Imaging Camera? 2) What are the advantages and disadvantages of using a Thermal Imaging Camera? 3) What are the limitations of a Thermal Imaging Camera? 4) What procedures should be followed when operating a Thermal Imaging Camera?

The major findings of this research project indicated that Thermal Imaging Cameras were being utilized in the majority of cases at building fires, search and rescue operations, and hazardous materials incidents. Data collected during this research project identified several advantages of using a Thermal Imaging Camera including locating the seat of the fire, accelerating the completion of tactical objectives, and seeing through thick smoke. The disadvantages documented during this research project included white out in heavy heat, operators developed a false sense of security, and operators need for additional

training in order to properly utilize the cameras. The majority of the data indicated that the tactical objectives the cameras were utilized to address included size-up, search and rescue, and safety and fire attack.

The recommendations developed from this research project included the development of a Standard Operating Guideline for the use of Thermal Imaging Cameras including the identification of appropriate incident types for Thermal Imaging Camera usage, the advantages and limitations discovered during actual fire ground utilization, and specific tactical objectives that were efficiently completed by using the Thermal Imaging Cameras. Included in the recommendations is the need to revisit and update the Standard Operating Guideline as new information is developed and experiences are documented during the use of the cameras.

TABLE OF CONTENTS

INTRODUCTION

The City of Boca Raton Fire Rescue Services Department “CBRFRSD” believes in providing the highest level of service to its citizens. The City of Boca Raton has supplied all front line fire apparatus and supervisors’ vehicles with Thermal Imagining Cameras (“TIC”). These devices have been in service for almost five years. Operators have only received basic training in the uses and capabilities of these devices. I have found that the TICs are not being used uniformly throughout the organization. The problem is that the City of Boca Raton has not developed a Standard Operating Guideline for the use of this equipment. The purpose of this research is to ensure that all personnel are trained in the use of the TIC, and have a good working knowledge of its abilities and limitations. A Standard Operating Guideline will be developed. Evaluative research methodology was used to answer the following questions:

1. Under what conditions should firefighters use a Thermal Imaging Camera?
2. What are the advantages and disadvantages of using a Thermal Imaging Camera?
3. What are the limitations of a Thermal Imaging Camera?
4. What procedures should be followed when operating a Thermal Imaging Camera?

BACKGROUND & SIGNIFICANCE

The City of Boca Raton is a municipality located in Palm Beach County on the South East coast of Florida. Boca Raton encompasses twenty-eight (28)

square miles and has a population of approximately eighty-five thousand (85,000) people. The CBRFRSD is the sole provider of Fire Suppression, Emergency Medical Services, Fire Prevention, and Fire Safety Education programs to the citizens of Boca Raton. An explosion of growth has increased the number of emergency calls that the CBRFRSD responds to on an annual basis. In particular, in 2003 the CBRFRSD ran about fifteen thousand (15,000) emergency calls out of eight stations including five of which have full-time transport units, performed seven thousand (7000) Life Safety inspections, and maintained all stations and equipment needed to perform these operations.

Since Ben Franklin organized the first fire company in 1736, new tools and techniques have continually evolved to meet the difficult daily challenges faced by emergency responders, whether at fires or at other incidents. The TIC is an innovation, which increases the capabilities of the fire service to save lives and property, and to improve fire fighter safety.

TICs were first employed in the fire service in the late 1980s (McLaughlin, 1992). Departments like New York City employed these devices on specialized units including rescue companies to assist in the search and rescue tasks on the fireground (Gallagher, 1991). These early units were heavy and expensive, which prevented their widespread use.

Price competition and advances in technology created smaller, lighter, more durable and easier to operate TICs which positioned the devices within the reach of most fire departments by the early 1990s (Crickenberger, Sojka, 2000). In 1999 the City of Boca Raton purchased its first TIC and deployed it in

supervisors' vehicles. Within two years every front line unit was also equipped with a TIC. When these units were placed into service, factory trained personnel provided training to all fire department staff in the use and capabilities of these units. In the years to follow these units have been used in several types of incidents and several problems have arisen. The most important problem that has arisen is that the use of these cameras varies from fire unit to fire unit and from incident to incident. The CBRFRSD had no clearly defined policy for the use of this tool by the first arriving company at an emergency incident.

The CBRFRSD is currently expanding the services it provides. In 2002, a bond was passed, which will be used to build two (2) new fire stations, replace two (2) existing fire stations, and refurbish three (3) existing fire stations. This project has been given a three-year window for its completion. Not only is the construction of the new fire stations and the refurbishing of the old fire stations a monumental undertaking, this expansion will ultimately require the CBRFRSD to hire over one hundred (100) new personnel within the next five years.

Due to the growth of the CBRFRSD it is imperative that all equipment provided to the department is used properly and to its full potential for the safety of the citizens of Boca Raton. In particular, all existing and new technology must be used to its full capacity.

The City of Boca Raton strives for complete customer satisfaction and strives to offer new services. This applied research project is significant to the CBRFRSD for several reasons. This research project was designed to:

- Provide the CDRFRSD with information to insure the proper use and deployment of Thermal Imaging Cameras.
- Insure that money invested in new equipment and training programs is providing the citizens of the City of Boca Raton the highest level of service.

The National Fire Academy course requires that each student complete an applied research project within six months of completing his/her classroom instruction. This project refers to the National Fire Academy Executive Leadership program and the ability of Fire Officers to identify, recognize and mediate problems within the delivery of services to citizens. The analysis of the information gathered by this research will assist the CBRFRSD in identifying and improving service levels provided to the citizens of Boca Raton.

LITERATURE REVIEW

The purpose of this literature review was to gather pertinent information and to review past findings concerning the use and training of a TIC as it relates to the research questions posed. The literature review included journals, magazines, books, manuals, newspapers, and other information sources located at the Learning Resource Center of the National Emergency Training Center in Emmitsburg, Maryland. Summaries of the sources relevant to this applied research project are included in this report.

Under what conditions should firefighters use a Thermal Imaging Camera?

The fire service has found that in the area of fire operations search and rescue these TIC units assist in the survival of victims. This technology is being marketed at the heartstrings, Eisner wrote; "If we had had a TIC, we would have made the rescue, we could have saved the child or the firefighter." Many believe that If the TIC does that once, it's worth it's weight in gold (Eisner, H. 2000). In a Firehouse.com news article a TIC credited for saving a child (October 19, 1999) and helped in saving three children (April 26, 2001). Many articles indicate that this technology assists firefighters in a more rapid and comprehensive search and rescue.

Rescuing people from burning buildings is not an every day occurrence in the fire service, however, it is an every day occurrence to search for the source of a fire or for the source of the smell of smoke. With this thought in mind Eisner wrote; "the biggest tactical advantage is to locate the seat of the fire quicker, monitoring the changes in the thermal conditions as we are operating and the accountability of firefighters" (Eisner, H 2000).

The TIC saves firefighters from the time consuming task of opening walls and ceilings to check for fire extension and to determine where the fire is spreading (Patterson, T.E. 1997). The TIC provides a tactical advantage in extinguishing fires in structures having hidden areas such as pipe chases and concealed spaces in walls and ceilings, which allows fire crews to contain the fire with one hose line instead of the incident turning into a multi-alarm incident (Downey, R. 2000).

In the survey that was conducted several other uses of the TIC were identified including, the rapid search of vehicle accidents, both within the vehicle and for ejected subjects; overhaul; fire investigation; determination of fluid levels in sealed containers; and during training to facilitate the observation of new personnel in zero visibility situations where instructors would normally have to rely on their audio ability to determine the progress of the student. "Without a doubt, these high-tech pieces of firefighting equipment, used in conjunction with proven and safe operational skills (i.e., use of tag lines, following the hose line, observing changing fire conditions, and the like), will change the way fireground tactics and strategies and search and rescue operations are developed and implemented at the Johnson City Fire Bureau and in other departments" (Caldwill, Andrew S. 2001).

Hazardous material incidents offer different uses for the TIC, especially when there is no fire involvement. For example, the TIC can be used to visualize a heat wave moving through a flammable liquid tank, to determine the fluid levels inside of tankers and drums by measuring the difference in the temperature of liquid filled areas and vapor spaces. Of special importance the TIC may be able to recognize possible sources of ignition that may be missed by the naked eye (Stevens, L.S. 1991).

Another use for the TIC comes into play when a fire department must find one of its own in need of assistance. To reduce the risk of firefighter fatalities the fire service has mandated such operations as two in and two out, the establishment of Rapid Intervention Teams and Heads Up Displays to provide

firefighters with better control of their air supply. The development of Rapid Intervention Teams allows firefighters to carry other equipment in addition to an extra oxygen supply such as, a TIC to assist in the search and rescue of their own. An article in Firehouse stated that in the last two (2) years nineteen (19) firefighters' lives were saved with the use of the TIC (Richardson, M. & Scholer, R. 2001)

What are the advantages and disadvantages of using a thermal imaging camera?

Since the fire service faces many of the same visual impairments encountered on battlefields, TIC technology has migrated into the fire service. The TIC allows firefighters to see in zero visibility and speeds the search for victims and downed firefighters in structural fire conditions (Chickenberger, R. & Sojka, J. 2000).

The biggest advantage of the use of TICs is the ability for the firefighters to "get their vision back" in smoky or dark conditions (Richard, M. & Scholer, R. 1999). In addition, the seat of the fire is much easier to find, victims are easier to see and property damage is decreased because the firefighters are able to locate concealed fires.

A major disadvantage of using the TIC is that when firefighters have their sight returned, firefighters are more likely to take actions that endanger them, including standing and walking, advancing in a structure without reference points and advancing in a structure past the point of no return" (Richard, M. & Scholer, R. 2001).

The TIC is usually a very reliable piece of equipment, however it is a mechanical device that is subject to failure (Woodworth, S.P. 1997). In sprinklered buildings the TIC may respond erratically due to cool water flowing from the sprinklers, which in a super heated condition may shield hot spots (Coogan, M.R. 1992).

Although the TIC has certain disadvantages, as indicated in the literature review, most the authors made recommendations, which diminish these disadvantages. Most of the improvement recommendations center on proper training and understanding the capabilities and limitations of the device so that false confidence does not affect execution of proper techniques and decisions by firefighters.

What are the limitations of a Thermal Imaging Camera?

Along with the advances realized through the use of the TIC many limitations have become apparent as well. The time to prepare and train is before the unit arrives on the scene (Eisner, H 1993). The TIC operator must keep in mind that it is a mechanical device and is subject to failure (Nugren, A.S. 1997). When using the TIC, firefighters have a tendency to move too quickly in a structure because they have their vision back. In addition, many times the firefighter looses track of other firefighters and may become disoriented (Crickenberger, R., & Sojka, J. 2000). An inherent limitation of the TIC technology is that it is incapable of seeing through walls, glass, mirrors, water or other shinny objects thus giving false readings when used on reflective images (Render, G 1997).

Improper training or lack of training on the proper usage of and interpretation of the TIC image is a problem that adversely limits the advantages of TIC usage (Richardson, M. 2001). Misinterpretation of the TIC image can lead to a firefighter missing critical clues including flashover, building collapse indicators, and the failure to recognize victims (Carnegis, J.N. 1999).

The TIC has been compared to a new search dog and was found to have few limitations (Spivak, Mike (November-December 1999). The TIC cannot see through glass and some forms of camouflage may degrade an image, making it more difficult to find a target. Additionally, to most effectively detect an individual in a wilderness application, that individual must have a heat signature greater than his background. Oftentimes this is problematic on a very hot day, but at night, and in cooler temperatures or during winter, a thermal imager functions adequately.

What procedures should be followed when operating a thermal imaging camera?

The literature search at the National Fire Academy's Learning Resource Center (NFALRC) did not uncover any copies of Standard Operating Guidelines (SOG) for the use of the TIC. Further, very few departments surveyed have SOGs for the use of the TIC. Out of eighty-six (86) responses to my survey only eighteen (18) departments had written SOGs for use of the TIC. The majority of articles uncovered during the Literature Review referred to a procedure that someone had observed. Specifically, one author observed that when searching, the cameraman positioned himself at the door of the room to be searched. This

firefighter observed dangers and conditions and then relayed this information to the other search team members. The other team members then proceeded to search (Rinker, John G. 2002). Of the articles reviewed referencing SOGs the content ranged from merely a mention of the TIC as a possible tool to consider to a comprehensive SOG that would serve as a good outline for crew training on the TIC.

PROCEDURE

Definition of Terms

RIT: Rapid Intervention Team used to locate and rescue downed or lost firefighters.

SOG: Standard Operating Guidelines used by fire departments to provide guidelines for the proper handling of incidents.

TIC: Thermal Imaging Camera is a tool capable of converting infrared heat energy into viewable real time image.

Literature Review

A fire service literature search and review was conducted at the National Fire Academy's Learning Resource Center, Emmitsburg, MD during the week of May 17th to 28th 2004. The literature review targeted trade journals, magazines, and textbooks that contained information on the use of Thermal Imaging Cameras.

In addition, a search was performed of the Internet, using search engines such as Yahoo, MSN, and Google.

A Survey was conducted to answer the research questions, which is detailed below.

Question #1 Does your department use thermal imaging cameras (TICs)?

Question #2 Does your department have TICs on all first due engine/ladder companies?

Question #3 Does your department have written standard operating guidelines for the use of theses units?

Question #4 Does your department require training on these units and if so is the training competency based?

Question #5 Has your department identified any limitations in the use of TICs?

Question #6 Has your department identified any advantages in the use of TICs?

Question #7 Does your department require that a TIC be assigned to rapid intervention teams?

Question #8 Has your department developed any special functions for the TIC?

Question #9 Has your department experienced any problems with the TIC units and do you feel that the problem was an equipment problem or a personnel operation problem?

Question # 10 Does your department have more than one brand or type of TIC i.e., hand held or helmet mounted? Does your department require training on the use of all brands and styles of TICs used by the department?

Assumptions

The following assumptions were made: that the authors cited in the literature review conducted objective and unbiased research; that all respondents

of the TIC survey were knowledgeable in the subject matter and answered all questions honestly.

Limitations

The TIC survey does not represent the whole fire service. No statistical analysis was made to determine the margin of error in the survey's results. The information that was collected during the literature review and survey is only current and relevant as of the time that it was collected. More cameras go into service every day and are affecting the fire service's experiences with them. Those new experiences may have an affect on the answers to the survey, on the outcome of this paper and its recommendations.

RESULTS

The survey results identified for the following research questions are a culmination of the literature review and eighty-six (86) surveys that were returned. The detailed results of the survey are provided in Appendix B and a Standard Operating Procedure developed from this research is provided in Appendix C.

One hundred and twenty (120) surveys were sent out to Fire Rescue Services departments by mail and handed out at the NFA for completion. Eighty-six (86) were returned answered.

Under what conditions should firefighters use a Thermal Imaging Camera? The survey and literature review indicated that the TIC is used under the following conditions, including size-up, fire attack, search and rescue, locating

fire extention, command, hazardous materials, rapid intervention teams, wildland fires, overhaul and in any other circumstances that protect life and property.

What are the advantages and disadvantages of using a thermal imaging camera? In the survey thirty-one (31) departments identified advantages while forty-nine (49) departments did not identify any advantages. The advantages identified included rapid search, vehicle crashes search, USAR, training new personnel, overhaul, investigation, Haz-Mat uses.

The biggest advantage from the use of the TIC is the ability of the firefighters to “get their vision back” in smoky or dark conditions (Richard, M. & Scholer, R. 1999). In addition, the seat of the fire is much easier to find, victims are easier to see, and property damage is decreased because the firefighters are able to locate concealed fires.

One author indicated that “Having their sight returned, firefighters are more likely to take actions that endanger them, including standing and walking, advancing in the structure without reference points and advancing in a structure past the point of no return” (Richard, M. & Scholer, R. 2001).

In sprinklered buildings the TIC may act erratically due to the cool water flowing from the sprinklers creating a super heated condition in which the water may shield hot spots (Coogan, M.R. 1992).

Although the TIC does have certain disadvantages as found in the survey and literature review most the authors addressing these disadvantages made recommendations to diminish them. Most of the improvement recommendations centered on proper training and understanding the capabilities and limitations of

the TIC so that false confidence does not affect the execution of proper techniques and decisions by firefighters.

What are the limitations of a Thermal Imaging Camera? The survey found that thirty-two (32) departments had experienced both limitations, as well as malfunctions in the cameras. These departments indicated that the problems encountered included white-out in high heat, loss of situational awareness, low battery life, overconfidence in some situations, and forgetting the basics. Spivak (1999) and Eisner (2000) both reported limitations due to the way that the image may be presented to and interpreted by the firefighter. The interpretation of the image was also seen as a possible limitation by Roundtable (2000) because the image remains after the heat producing item is gone. Cogan (1992) and Lyons (1998) described instances where water and/or its cooling effect distorted the image or made it unclear. Woodworth (1997), Love (1999) and Eisner (2000) all reported limitations in battery life of the TIC.

What procedures should be followed when operating a thermal imaging camera? The research conducted at the NFA and through the survey tool both indicated that their were very few written procedures for the use and operation of the TIC. Out of eighty-six (86) responses to my survey only eighteen (18) departments has written SOGs for the TIC. The literature review indicated that most articles referred to a procedure that someone observed. One article stated that the author observed that when searching the cameraman positioned himself at the door of the room that is about to be searched. The firefighter observes dangers and conditions and then relays this information to the other search team

members. The other team members then proceed to search (Rinker, John G. 2002). Of the article referencing SOGs the content ranged from merely a mention of the TIC as a tool to consider to a SOG that was very comprehensive and would serve as a good outline for crew training on the TIC.

DISCUSSION

The purpose of this research project was to develop a SOG for tactical use of the TIC in the City of Boca Raton Fire Rescue Service Department, but during the research I found several interesting facts and issues that I hadn't considered prior to beginning this project. Specifically, I was surprised to find that of the departments surveyed that were using TICs, sixty-four (64) out of eighty-six (86) departments did not have a SOG for the use of the TIC.

The research conducted on thermal imaging cameras demonstrates that the technology is improving and that the fire service's use of them is increasing. Corbin (2000) described how the first cameras needed to be cryogenically cooled and were too large for the fire service to use. Spivak (1999) described that the first cameras from the 1980's used solid state electronics and were small enough and inexpensive enough for the fire service to utilize. The expansion of the technology throughout the market place has produced numerous suppliers and competition that has pushed the price of these units down.

The first thought most people have about the benefit of TICs is a quicker and safer victim search, thus the capability to save more lives (Eisner, H. 2000). Ask just about any firefighter and they will tell you they can conduct quicker searches with the TIC, however most fires responded to do not include a trapped

occupant. The most common tactical use of the TIC is to find the seat of the fire to allow for quicker extinguishments (Eisner, H. 2000). If firefighters are able to do quicker searches and locate the seat of the fire quicker then it should be possible to make maximum use of the human resources on the scene. Finding the fire quickly can reduce the magnitude and final outcome of the incident by turning what could usually be a multi-company fire to one that can be handled by a single engine company (Downey, R. 2000).

The advantage of a TIC is that it allows the firefighter to regain vision previously lost due to heavy smoke conditions (Richardson, M. & Scholer, R 1999). The down side of the firefighter being able to see again, is that basic skills are no longer being used, which for years have improved the firefighters chance of getting out of a burning structure safely. Firefighters through reliance on the TIC are now moving deeper and faster into hazardous situations, if the TIC fails the firefighter may become disoriented and may not be able to retrace his or her entry path to allow for a safe exit (Crickenberger, R., & Sojka, J. 2000).

The TIC has given the firefighter the advantage of being able to see the structural members of a structure to determine if the structure is sound and safe. The problem with this, however is that the person using the camera must be well trained to interpret the image. For example, a hole in the floor may appear to be hot or cold but the image may actually be showing a hole in the floor with fire below it (Mclaughlin, J. 1992). If the operator properly understands the image he or she is viewing, the possibility of structural collapse may be identified early and crews removed safely prior to a collapse.

Throughout my research I found one constant, training has not kept pace with the technology of the TIC (Woodworth, S.P. 1997). Many departments, mine included, provide only the training offered by the TIC sales people after the sale. The lack of proper training can limit the use of the TIC and endanger the firefighter due to lack of knowledge about the equipment. For some unknown reason the majority of departments seem to think the use of a TIC is a “no brainer”, but as the TIC is used in the field its true complexities are realized.

RECOMMENDATIONS

The City of Boca Raton Fire Rescue Service Department should develop a SOG on the proper tactical usage of thermal imaging cameras. Information gained from this research project will be used to insure that the SOG is comprehensive and addresses real world situations that are likely to be encountered during field usage. After the TIC SOG is developed, training should be conducted to insure that all personnel are competent in the usage of TIC including knowledge of:

1. Advantages realized by the use of thermal imaging cameras.
2. Disadvantages realized by the use of thermal imaging cameras.
3. Under what conditions thermal imaging may provide a tactical advantage.
4. Limitations realized by the use of thermal imaging cameras.
5. Rapid intervention team usage of thermal imaging cameras.
6. Interpretation of thermal imaging pictures.
7. Reinforcement of basic firefighting skills.

The training should consist of classroom instruction and actual training in live fire situations under controlled circumstances.

The departments then should develop a SOG and train their personnel to insure this valuable tool does not become a liability to their firefighters.

Further research on the tactical use of TICs should be conducted by organizations such as the National Fire Protection Association to develop standards for the use of TICs similar to what has been done with self-contained breathing apparatus, protective clothing and vehicles.

As TIC technology continues to improve new training and SOGs will have to be developed to meet the requirements of these newer technologies.

The benefits of these recommendations and the SOGs produced are to provide for the safe use and deployment of TICs.

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APPENDIX A

Thermal Imaging Survey

1. Does your department use Thermal Imaging Cameras (TICs)? Yes No

   If you do not use TICs please do not continue.

2. Does your department have TICs on all first due engine/ladder companies? Yes No

3. Does your department have written standard operating guidelines for the use of theses units? Yes No

4. Does your department require training on these units and if so, is it competency based? Yes No

5. Has your department identified any limitations in the use of TICs? Yes No. If yes, please list the limitations below.

   _____

   _____

6. Has your department identified any advantages in the use of TICs? Yes No. If yes, please list the advantages below.

   _____

   _____

7. Does your department require a TIC be assigned to Rapid Intervention Teams (RIT)? Yes No

8. Has your department developed any special functions for the TIC? Yes No. If yes, please list theses functions below.

_____

_____

9. Has your department experienced any problems with the units? Yes No. If yes, do you feel that it was an equipment problem or a personnel operation problem?

_____

_____

10. Does your department have more than one brand or type of TIC i.e., hand held or helmet mounted? Yes No. If yes, does your department require training on the use of all brands and styles of TICs? Yes No

APPENDIX B

Thermal Imaging Survey Results

1. Does your department use Thermal Imaging Cameras (TICs)? If you do not use TICs please do not continue.
2. Does your department have TICs on all first due engine/ladder companies? **32 Yes 50 No**
3. Does your department have written standard operating guidelines for the use of these units? **18 Yes 64 No**
4. Does your department require training on these units and if so is it competency based? **32 Yes 50 No**
5. Has your department identified any limitations in the use of TICs? **32 Yes 50 No** If yes, please list the limitations. **White-out in high heat, loss of situational awareness, overconfident of situation, forgetting the basics.**
6. Has your department identified any advantages in the use of TICs? **31 Yes 49 No** If yes, please list the advantages. **Rapid search, vehicle crashes search, USAR, training new personnel, overhaul, investigation, Haz-Mat.**
7. Does your department require a TIC be assigned to Rapid Intervention Teams (RIT) ? **36 Yes 46 No**

8. Has your department developed any special functions for the TIC?

   24 Yes 58 No Please list these functions below. **Haz-mat incidents, rubbish fire overhaul, grass/brush fire overhaul, search large area for victims.**

9. Has your department experienced any problems with the units and do you feel that it was an equipment problem or a personnel operation problem?

   White out in high heat, proper maintance, battery life.

10. Does your department have more than one brand or type of TIC i.e. Hand held or Helmet mounted and does your department require training on the use of all brands and styles of TICs? **24 Yes 58 No**

APPENDIX C

SOG FOR THE PROPER TACTICAL USE OF THERMAL IMAGING CAMERAS

PURPOSE:

To establish standard operating guidelines (SOG) for the proper tactical use of thermal imaging cameras (TIC).

SCOPE:

This guideline applies to all deployments of thermal imaging cameras including, but not limited to, search and rescue, fire size up, fire attack, RIT deployments, Haz-Mat, overhaul, ventilation, and investigation.

ADVANTAGES OF TIC USAGE:

The TIC allows the user to see through dense smoke and low light situations by use of the infrared spectrum. The TIC functions by using a video display to give the user a picture of heat signatures. The TIC allows the user to conduct quicker victim searches and rescues, as well as quicker identification of the seat of the fire or hot spots in concealed spaces. The TIC can also be used to identify weakened structural members thus warning the user of the possibility of eminent structural collapse.

LIMITATIONS OF THE TIC:

The user must keep in mind that the TIC cannot see through walls, through beds or through windows. Shiny surfaces such as glass and water reflect the image, sometimes the user actually sees himself or herself in the reflected image. The

TIC is a mechanical device and is subject to failure at inopportune times leaving the user without the vision level they have grown accustomed to with the TIC.

DISADVANTAGES OF THE TIC:

The TIC is one more thing to carry, but the user generally finds the advantages of the TIC outweighs this inconvenience. TIC usage may cause the user to abandon proper basic fire ground techniques and cause the user to become disoriented inside of a structure. With the vision restored by the TIC many users tend to stand and walk in areas they normally would have crawled in. The TIC user should not move too fast and/or deep into a structure that they loose contact with other crew members and hose-line protection. Batteries in the TIC must be carefully monitored to avoid failure from low battery levels.

TACTICAL USAGE OF THE TIC:

The TIC should be used by the first arriving company officer during size up. Items that may be addressed by TIC usage during size up include, but not limited to:

Location of a fire in a structure

Proper entry points for fire attack

Ventilation location choices based on fire location

Hazardous materials spills

Fluid levels in tanks

Chemical reactions producing heat

SEARCH AND RESCUE OPERATIONS:

As an incident progresses TIC usage should shift gears and become another tool in the commanders toolbox. The TIC should be used during primary and secondary searches. The user must keep in mind that basic fire-fighting skills will enhance the abilities of the TIC user. Remember to stay low to avoid trip hazards and to also keep in mind that the TIC has a limited field of view. During search operations make sure to scan the entire room high and low while also checking concealed spaces such as closets, under beds, in storage chests, always remembering that a child may try to hide from the fire.

USAGE OF TIC DURING FIRE SUPPRESSION:

During any interior operations the TIC should have the transmitter turned on (if equipped) so the Incident Commander will be able to evaluate interior conditions. When using the TIC for fire control, once again it is important to remember to scan the entire room high and low, checking for high heat conditions at the ceiling indicating the possibility of flashover. If the screen whites out when you look into a room give the camera a couple of seconds to readjust to the new heat levels. The camera will then give you a view of the hottest areas in the room. As water is applied to the fire, the thermal levels in the room will change, the operator should make note of these changes to determine the effectiveness of fire streams.

TIC USAGE BY RIT TEAMS:

Each RIT should be assigned a TIC to allow for rapid deployment to search for a downed or trapped fire fighter. The same skills applied during any other search and rescue operation should be applied by the RIT.

USAGE OF TIC FOR OVERHAUL:

The TIC is a valuable tool during the overhaul process, the entire area will show heat signatures, however hot spots will be easily identified. Remember the TIC cannot see deep into debris piles so standard overhaul procedures should be used. The TIC is a valuable tool while checking for fire extension, it cannott see through walls but it can show hot spots on the walls caused by fires in concealed areas.

GENERAL CONSIDERATIONS:

The TIC is a tool to help the fire department do a better job in resource utilization. Some operations may be completed more rapidly with the TIC thereby freeing up resources to provide other vital functions. Remember the TIC is not the answer to all problems encountered on emergency scenes. Good basic fire fighting and search techniques must not be abandoned. Remember basic skills may save your life if the TIC fails.

MISCELLANEOUS USES OF THE TIC:

Each member of the department is encouraged to use the TICs on incidents the member may not normally think of using the TIC on. The TIC is very effective

when used for smell of smoke calls to identify heat or ignition sources that cannot be seen by the naked eye such as overheated light ballasts.